
Citation:

Tee, JC (2018) Growth and maturity in swimming - a tale of two swimmers. In: SwimEngland Sport Science and Medicine Conference 2018, 11 March 2018 - 11 March 2018, Loughborough. (Unpublished)

Link to Leeds Beckett Repository record:

<https://eprints.leedsbeckett.ac.uk/id/eprint/5124/>

Document Version:

Conference or Workshop Item (Published Version)

The aim of the Leeds Beckett Repository is to provide open access to our research, as required by funder policies and permitted by publishers and copyright law.

The Leeds Beckett repository holds a wide range of publications, each of which has been checked for copyright and the relevant embargo period has been applied by the Research Services team.

We operate on a standard take-down policy. If you are the author or publisher of an output and you would like it removed from the repository, please [contact us](#) and we will investigate on a case-by-case basis.

Each thesis in the repository has been cleared where necessary by the author for third party copyright. If you would like a thesis to be removed from the repository or believe there is an issue with copyright, please contact us on openaccess@leedsbeckett.ac.uk and we will investigate on a case-by-case basis.

Growth and maturity in swimming

A story of two swimmers

Dr. Jason Tee

Email: j.c.tee@leedsbeckett.ac.uk

Twitter: [@JasonCTee](https://twitter.com/JasonCTee)

11 March 2018





How to survive the talent development pathway

Meet the characters

Marjorie Majority



Talented!!!

Winner at national championships

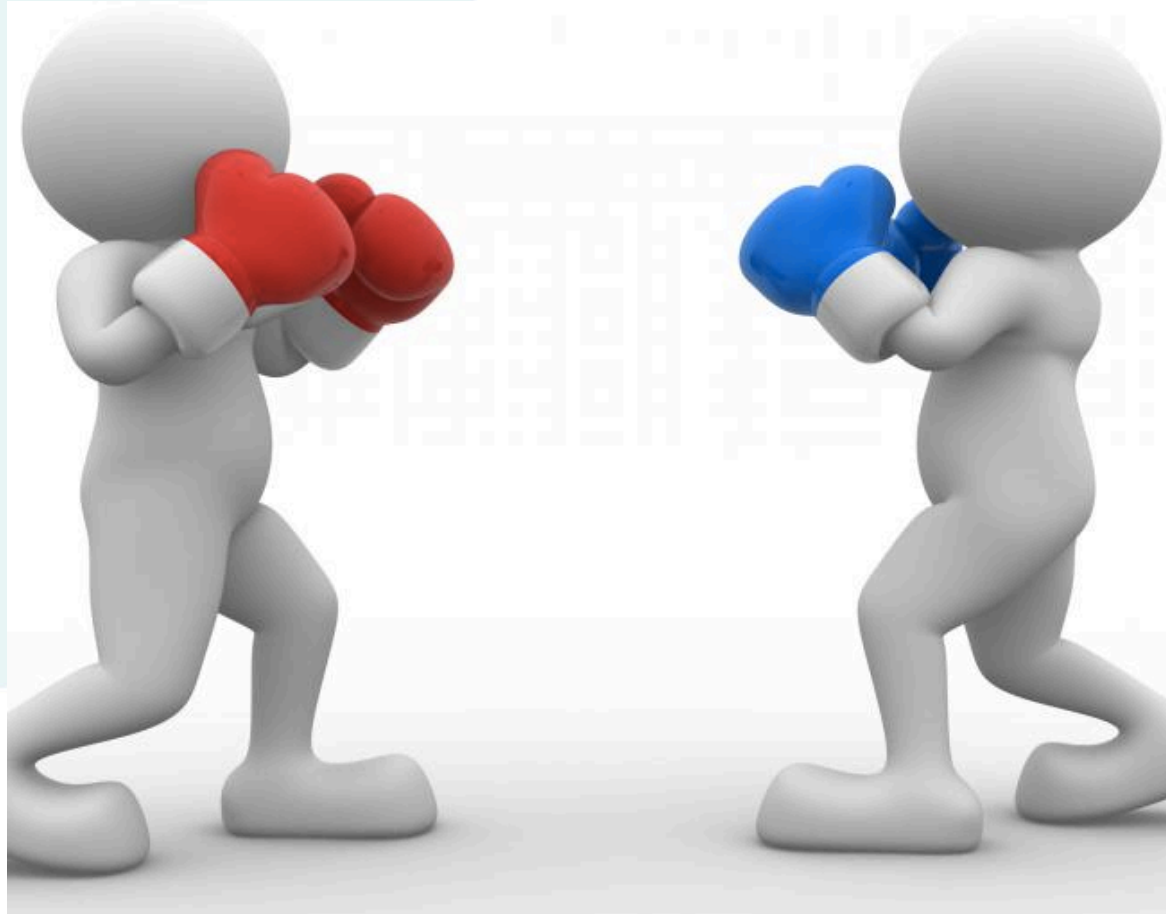
Dorothy Different



Talented

Narrowly missed selection for national championships

The battle



The difference



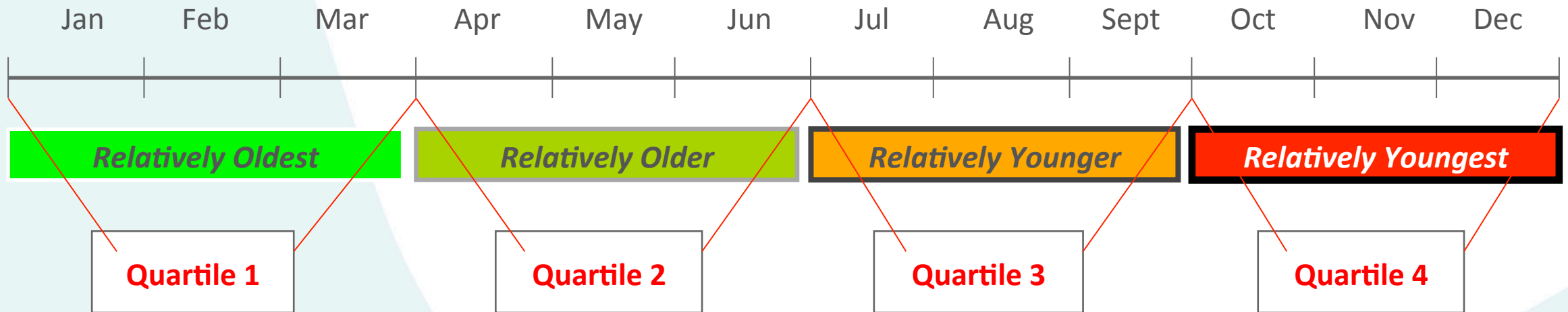
Relative Age Effect

The luck of your birthday

What is relative age effect?

Relative Age =

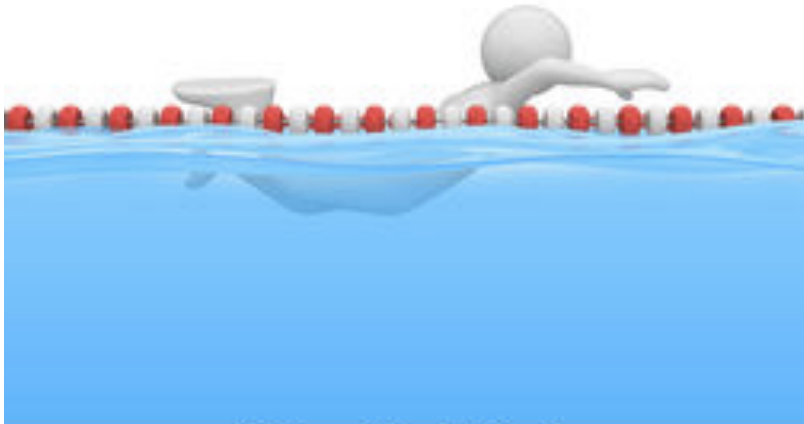
Potential differences in an age within an annual cohort.



Annual-age grouping policy

At 12 years old.... 8 months makes a big difference..

Marjorie Majority



Born in January

Dorothy Different



Born in August

Research

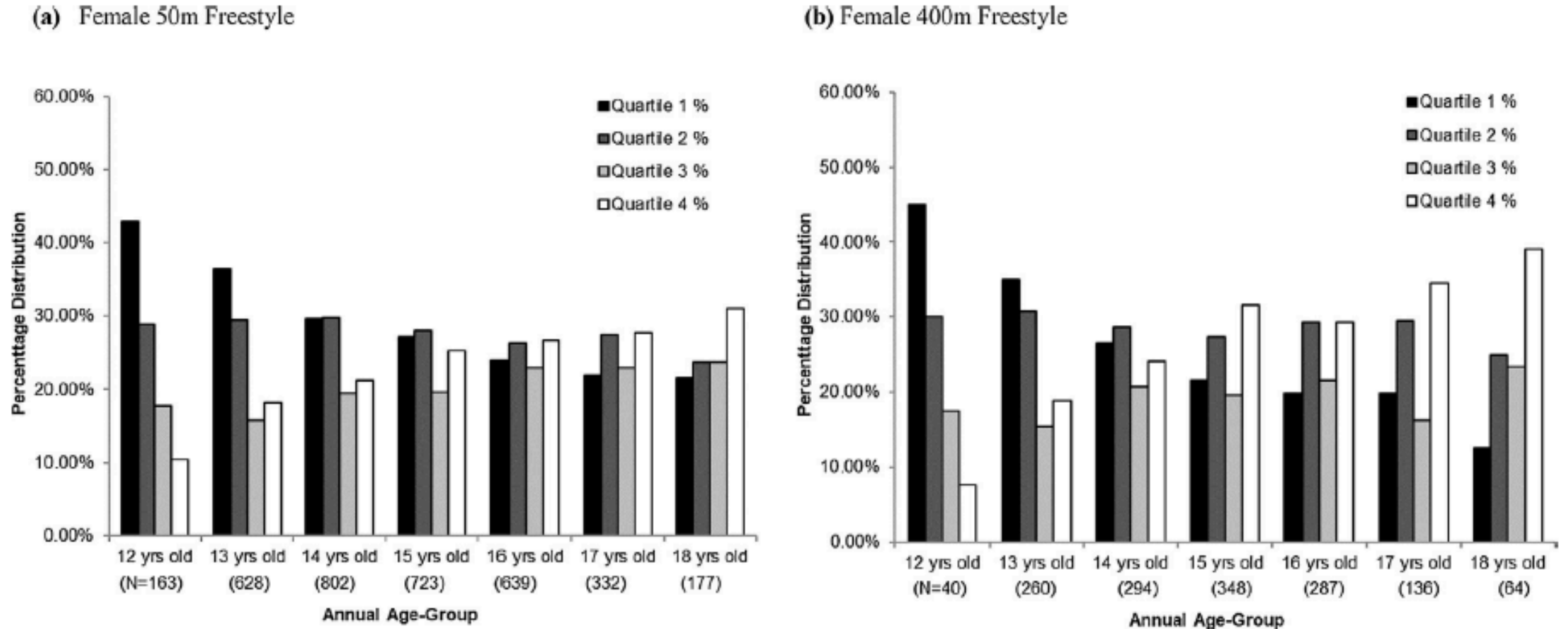


Fig. 1. (a & b) A graphical summary of female participants competing in the 50 m (a) & 400 m (b) Freestyle at the National Swimming Championships (2000–2014 inclusive) according to annual age group and quartile.

Messages received at this stage matter

Marjorie Majority

Fixed Mindset

Believes talent is inborn

Desires to be seen as perfect and talented, so...

She avoids challenge

Gives up easily

Sees effort as temporary

Gets frustrated or ignores feedback or criticism

Feels threatened by others' success



Leads to a very emotional cheerleader that is constantly trying to regulate herself and the way others view her. This creates a rigid and difficult athlete that is limiting her potential.

Dorothy Different

Growth Mindset

Believes ability can be developed

Ultimate desire is to learn and improve, so...

She embraces challenge

Pushes through setbacks

Believe her effort is most important

Uses feedback and criticism as a way to improve

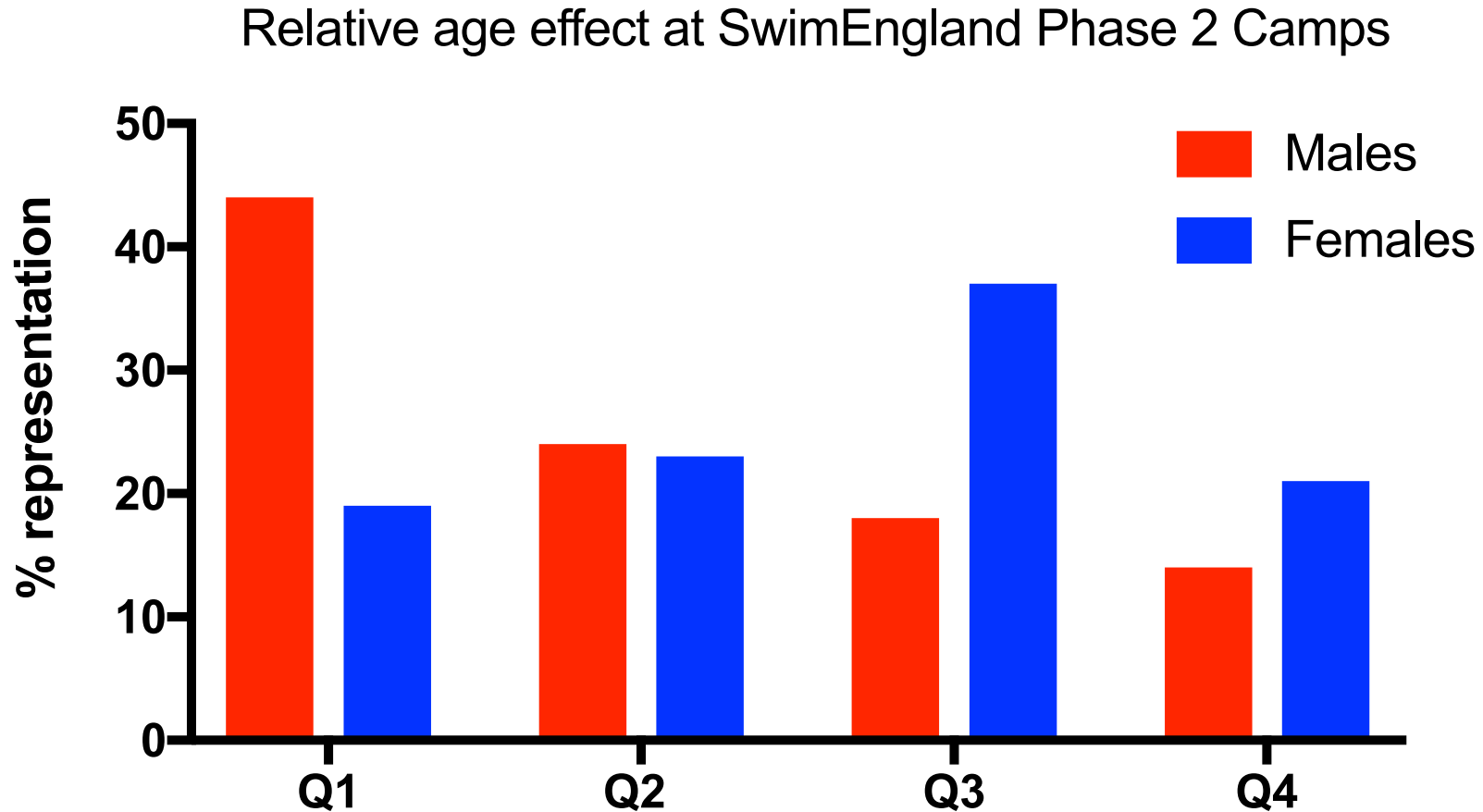
Is inspired by and learns from others' success



Leads to a hard working cheerleader that is constantly looking to better herself. This creates a calmer, more open-minded athlete that is coachable and can reach her fullest potential.



Our data... Phase 2 camps



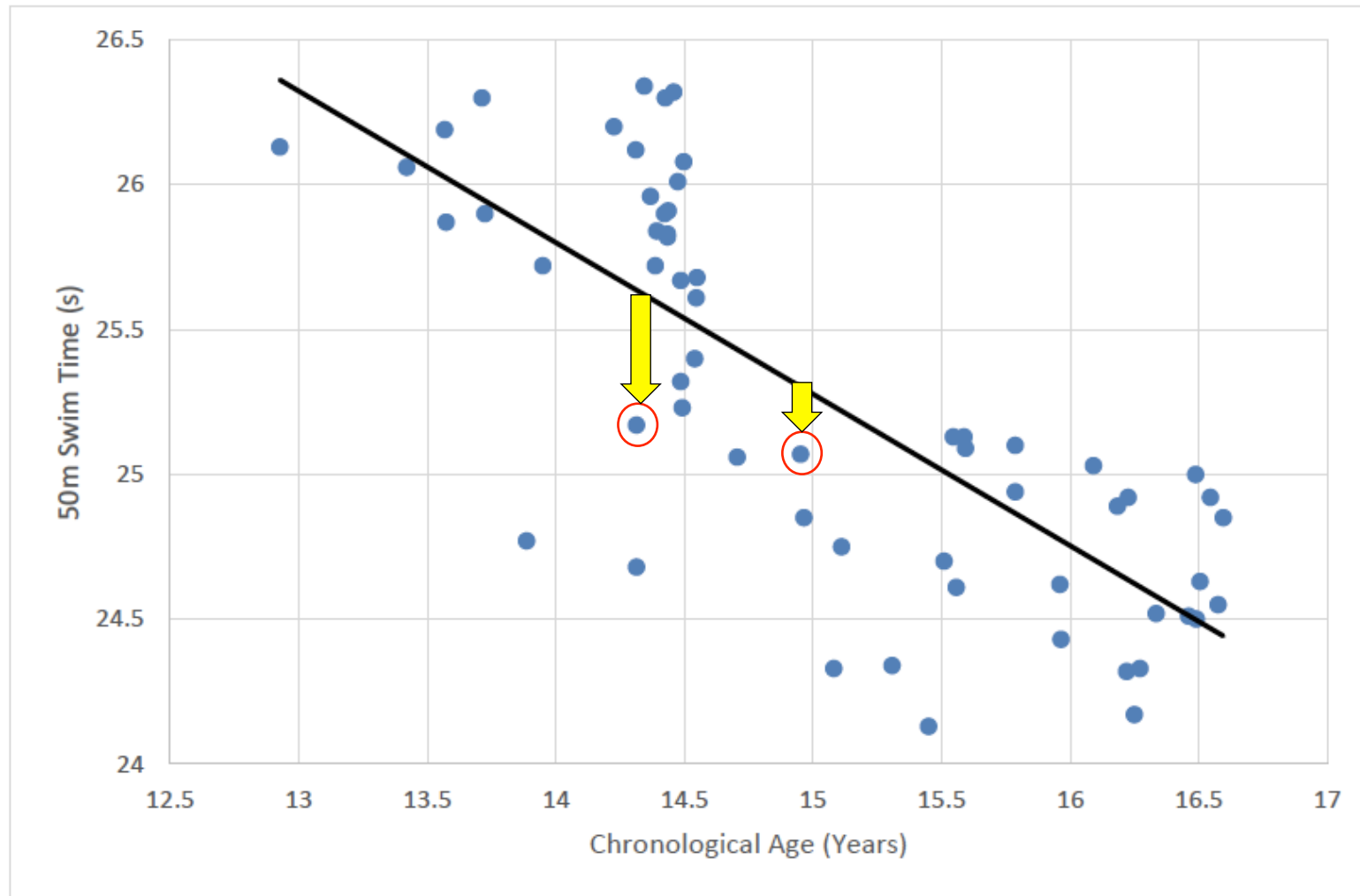
At 15-16 years old, RAE is no longer evident for females, but is still evident for male swimmers

What does this mean for us?

- Should we have representative selection younger than 15?
- Can we be more scientific in our selection and correct for RAE?
- What messages are we sending around early selection?

Age correction for selection

Figure 1. 50m Male Swim Performance vs Chronological Age

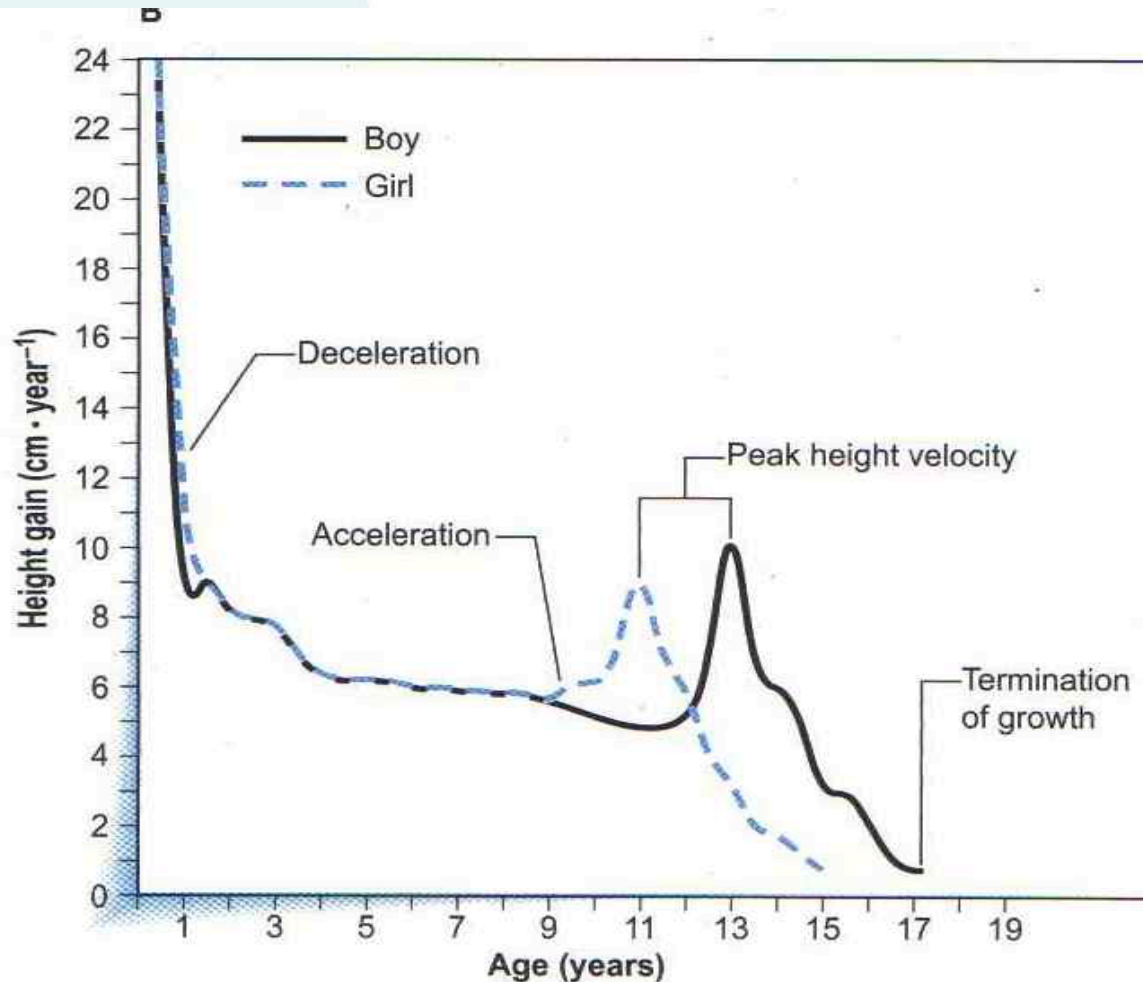


Maturity Effects

Timing of the growth spurt

Growth Curves

Growth in Height and Velocity Curves (Malina et al., 2004)

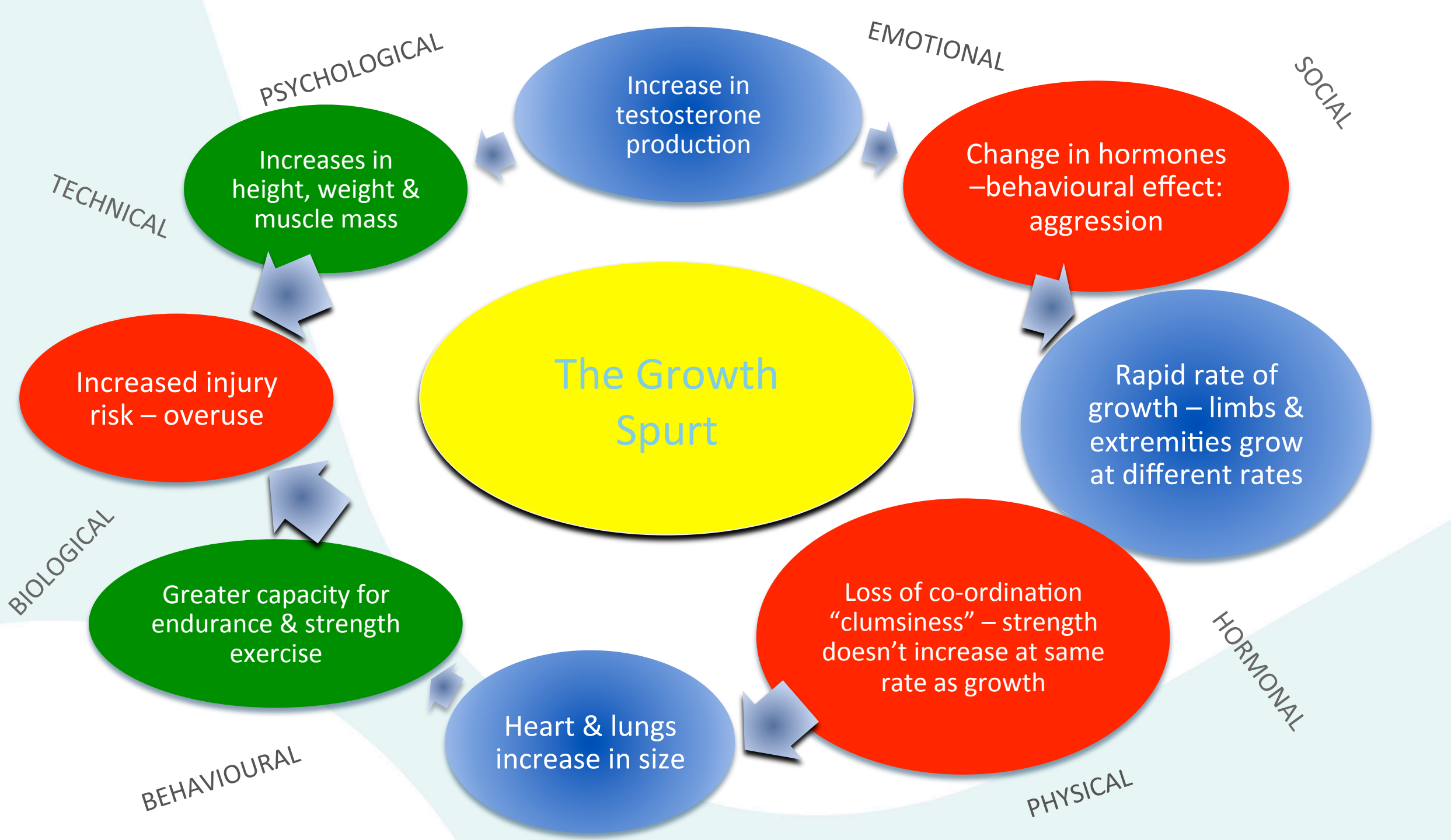


PHV usually occurs at

11.3 – 12.2 years in girls

13.3 – 14.4 years in boys.

BUT this varies considerably in the general adolescence population. For example, PHV for British boys could occur anywhere between 12.0 and 15.8 years



Variation in maturation

“Growth and maturation are non-linear phenomena which vary greatly between individuals in terms of both timing and tempo.”

Robert M. Malina

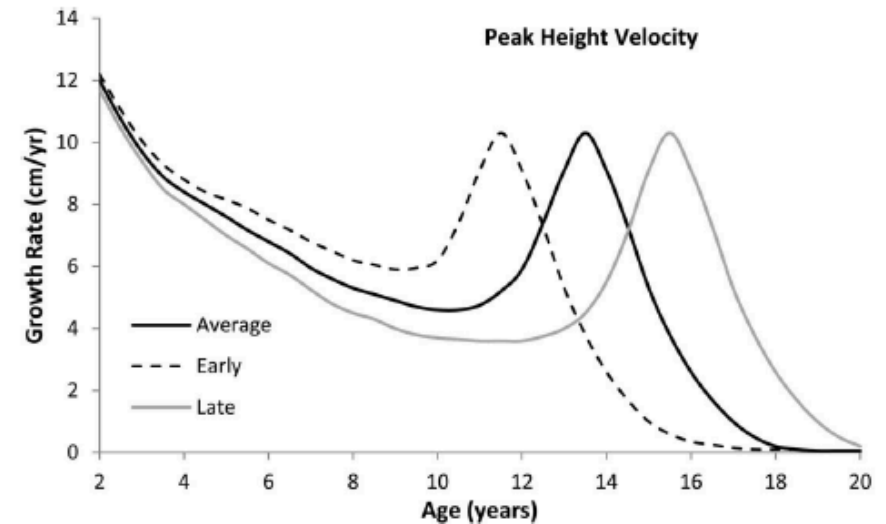


Figure 3. Change in growth rates (centimeter per year) with chronological age (years) for early-, average-, and late-maturing individuals based on theoretical data (adapted from Stratton and Oliver (57)). Adaptations are themselves works protected by copyright. So in order to publish this adaptation, authorization must be obtained both from the owner of the copyright in the original work and from the owner of copyright in the translation or adaptation.

Variation in maturation



**FOREWARNED,
FOREARMED; TO
BE PREPARED IS
HALF THE
VICTORY.**

Miguel De Cervantes
Spanish Novelist

1547 - 1616

QUOTEHD.COM



Determining Maturity

Age at PHV – Mirwald (2002)



Maturity offset =
 $-29.769 + 0.0003007$
 $\times \text{leg length and sitting height interaction} - 0.01177$
 $\times \text{age and leg length interaction} + 0.01639$
 $\times \text{age and sitting height interaction} + 0.445$
 $\times \text{leg by height ratio}$

(1)



Maturity offset =
 $-16.364 + 0.0002309$
 $\times \text{leg length and sitting height interaction}$
 $+ 0.006277 \times \text{age and sitting height interaction}$
 $+ 0.179 \times \text{leg by height ratio} + 0.0009428$
 $\times \text{age and weight interaction.}$

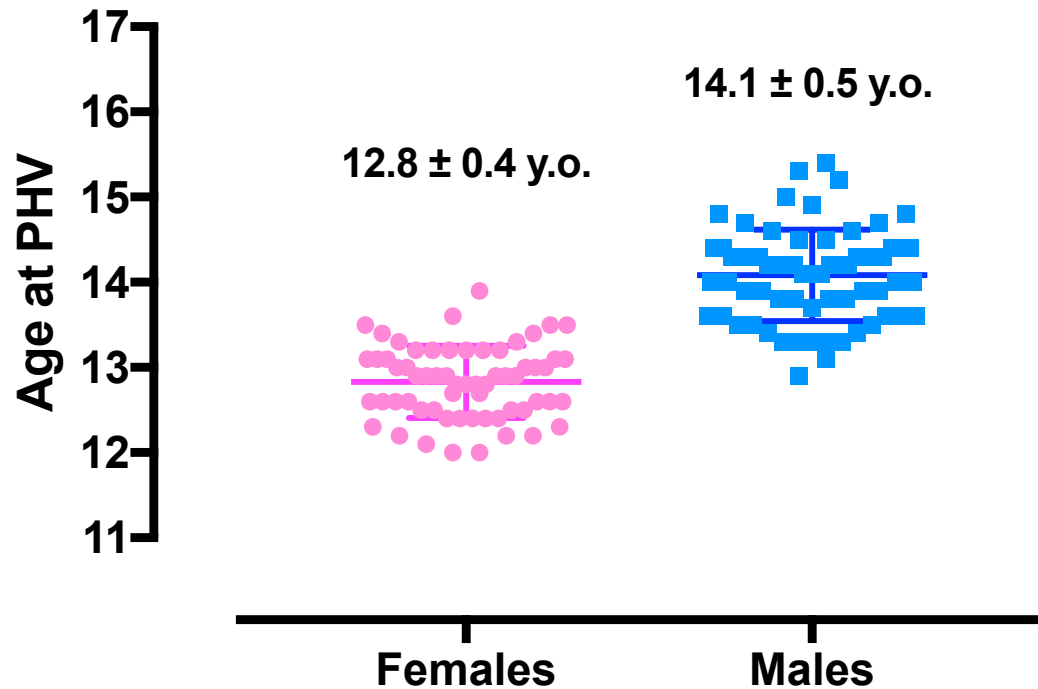
(2)

Peak height prediction – Khamis & Roche (1994)



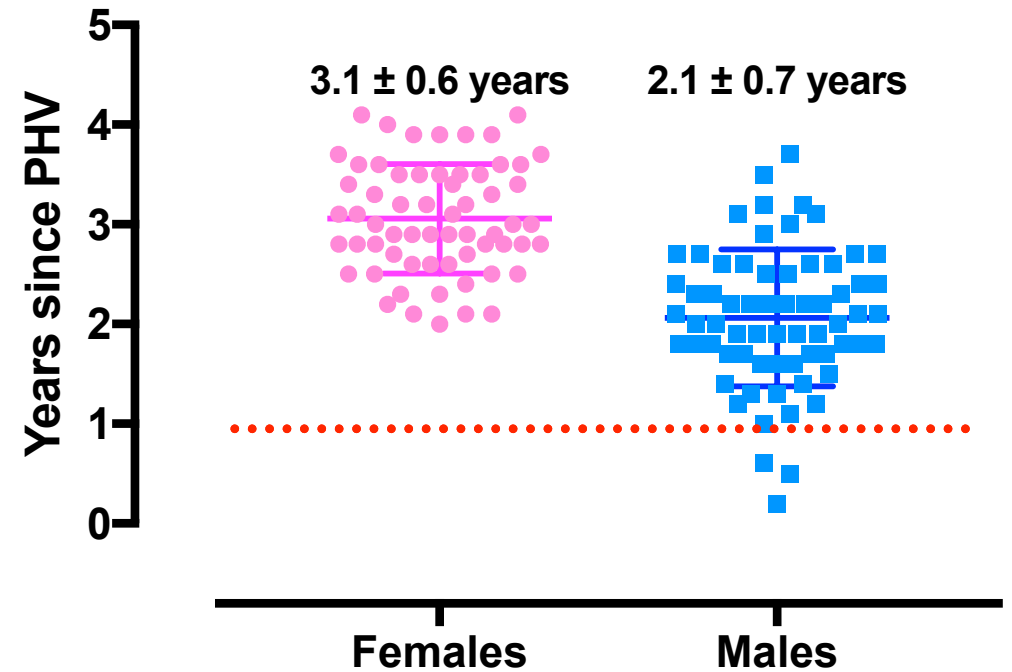
Our data... Peak Height Velocity

Phase 2 camp attendees



Ranges: 12.0 to 13.9 12.9 to 15.3

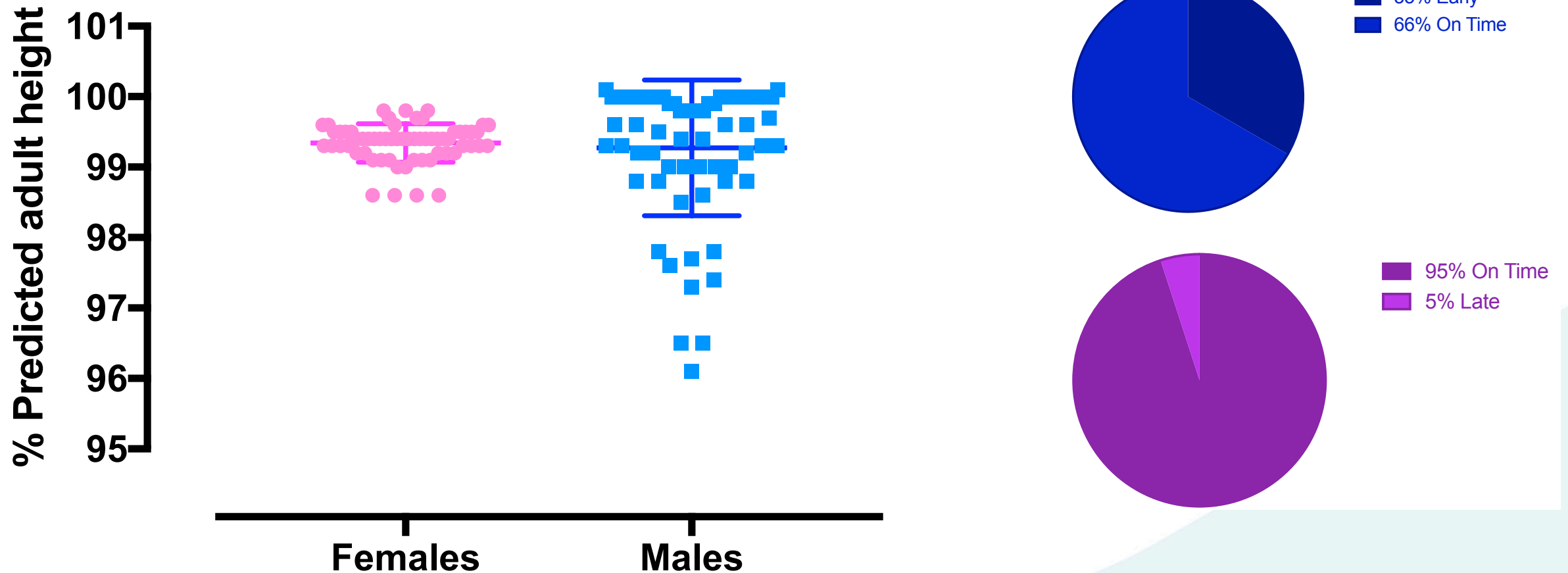
Phase 2 camp attendees



Ranges: 2.0 to 4.1 0.2 to 3.5

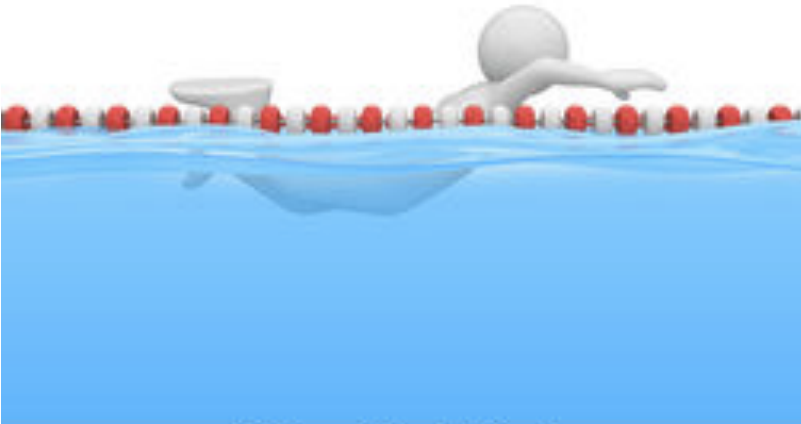
Our Data... Predicted adult height

Phase 2 camp attendees



At 13 years old.... How does this affect our girls?

Marjorie Majority



Early maturer

Dorothy Different



Late maturer

Marjorie's coach



- Is very impressed by her progress
- Doesn't have any girls who can compete with her, so challenges her to swim with the boys

Dorothy's coach

- Has done some maturity measurements
- Knows Dorothy is a slightly late maturer, but that she will ultimately be taller than average
- Encourages “integrated neuromuscular training”
- Encourages Dorothy to play different sports
- Ensures that enjoyment is maintained.

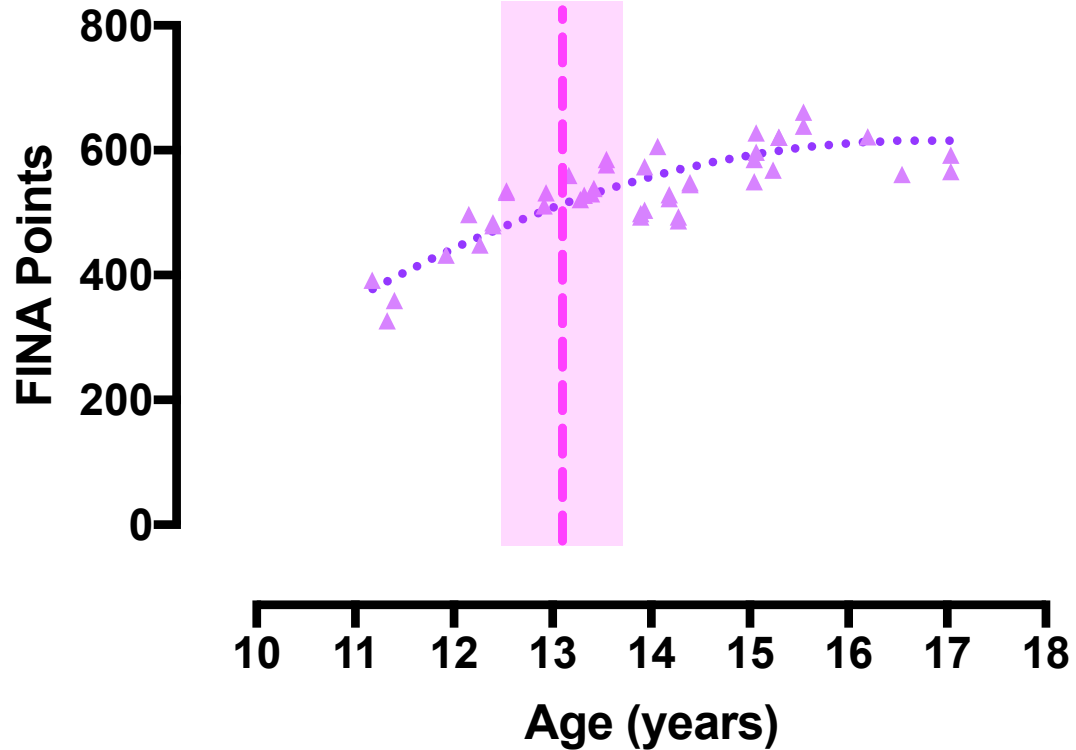


So what
happened?

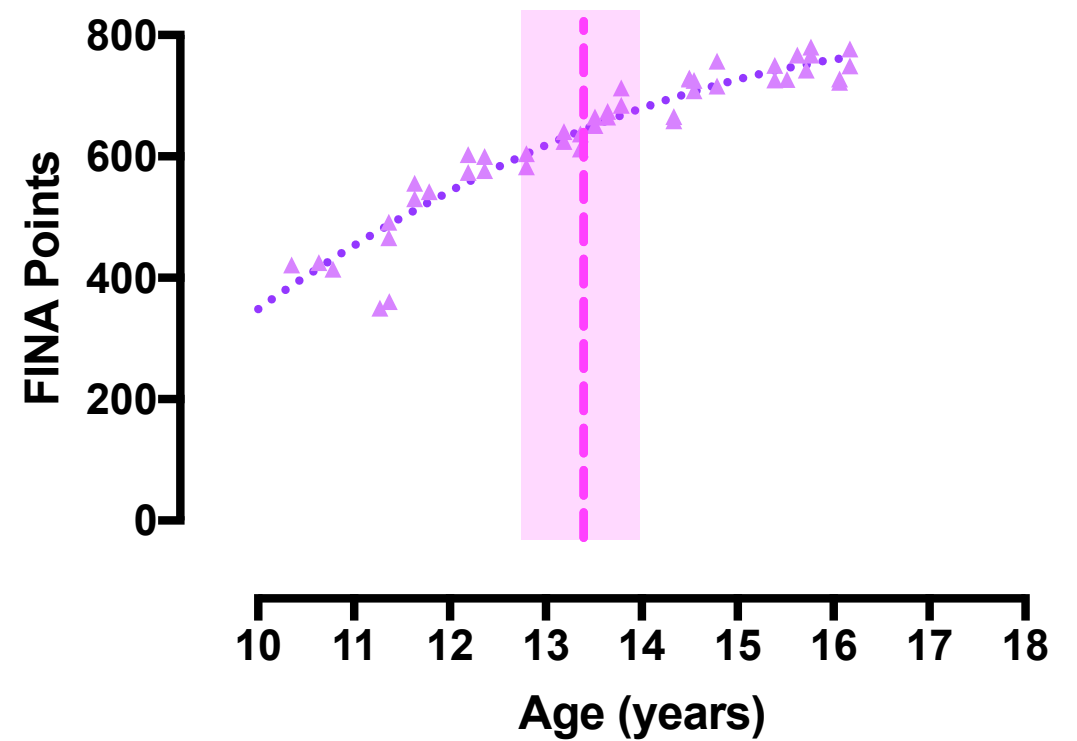


Marjorie stagnates, Dorothy thrives

Marjorie

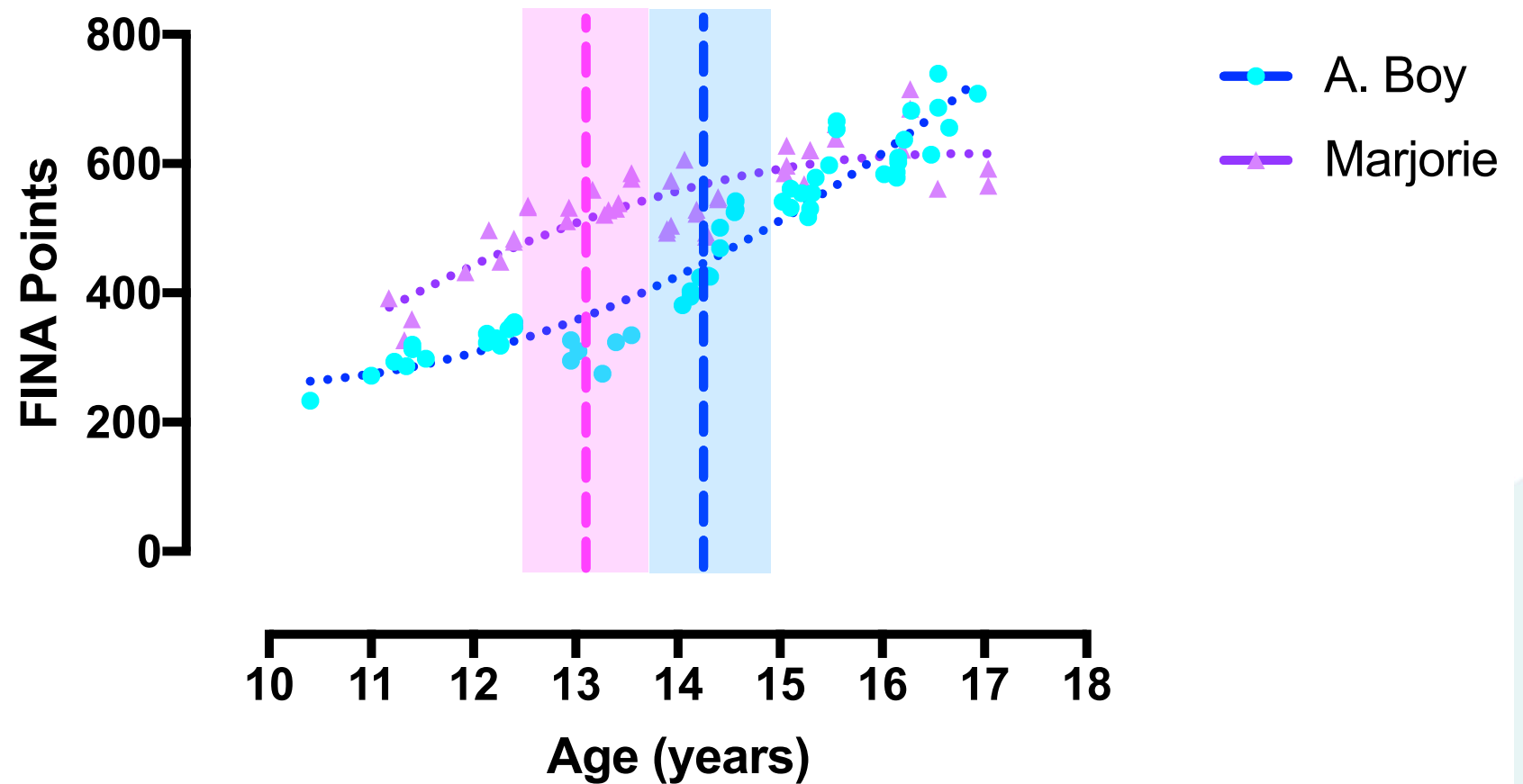


Dorothy



Critical differences in approach

- Marjorie is out performing boys of the same age at 12 & 13
- Boys progress massively during growth spurt
- With matched training Marjorie stagnates and becomes frustrated

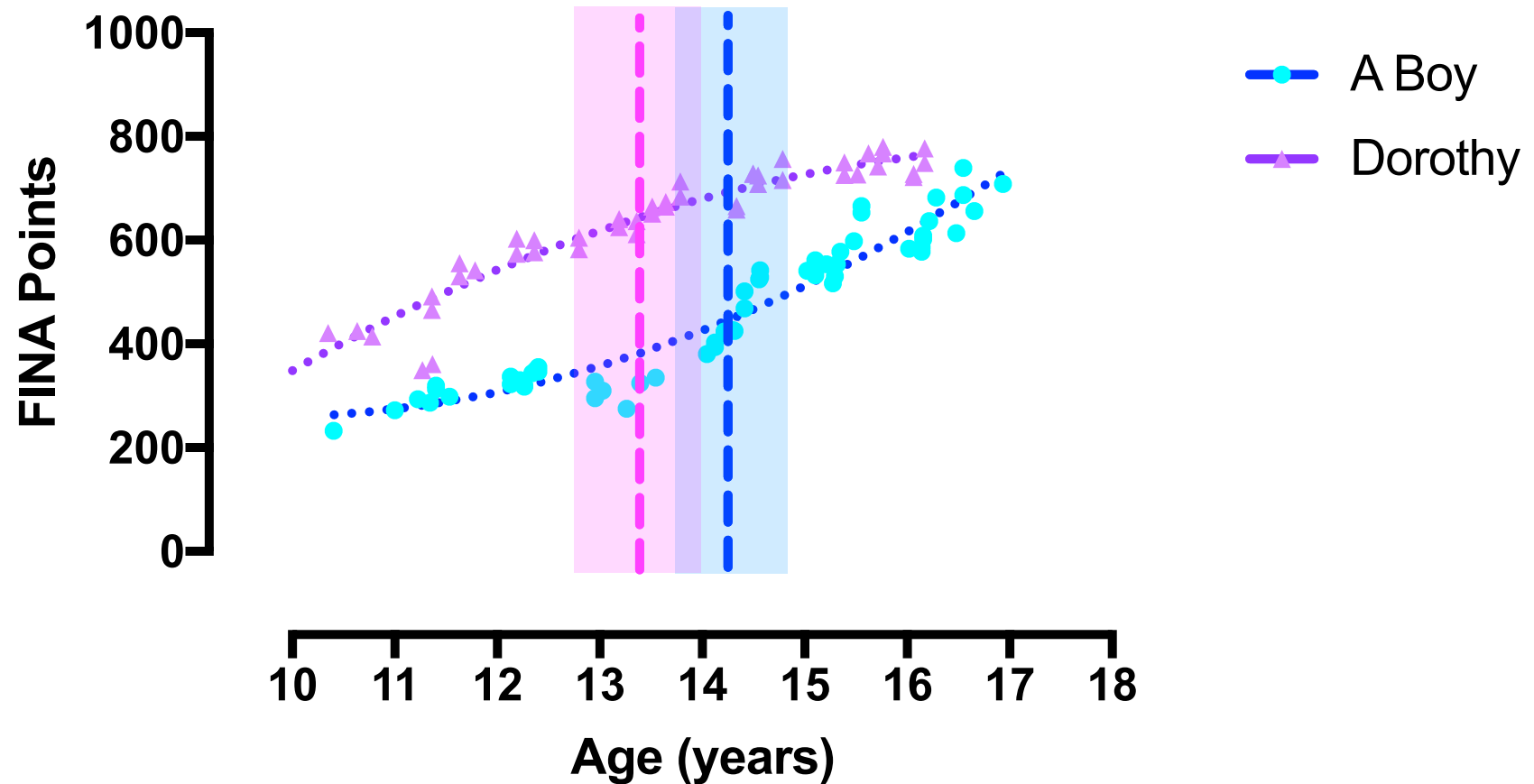


Stagnation, frustration and overtraining



Critical differences in approach

- Dorothy performs age appropriate training throughout
- Trains independently of boys
- Makes consistent progress, and eventually overtakes her age matched, early maturing peers



Fulfillment and attainment



Measure, don't guess



WITHOUT DATA

YOU'RE JUST ANOTHER PERSON

WITH AN OPINION

W. EDWARDS DEMING

(St)age appropriate training

Pre-
PHV

Integrated
Neuromuscular
Training

Multi- Sports

Focus on skill
development and
enjoyment

Circa-
PHV

Manage training
loads carefully

Be understanding
of complex Bio-
Psycho-Social
changes

Emphasize social
aspects – team
and relationships

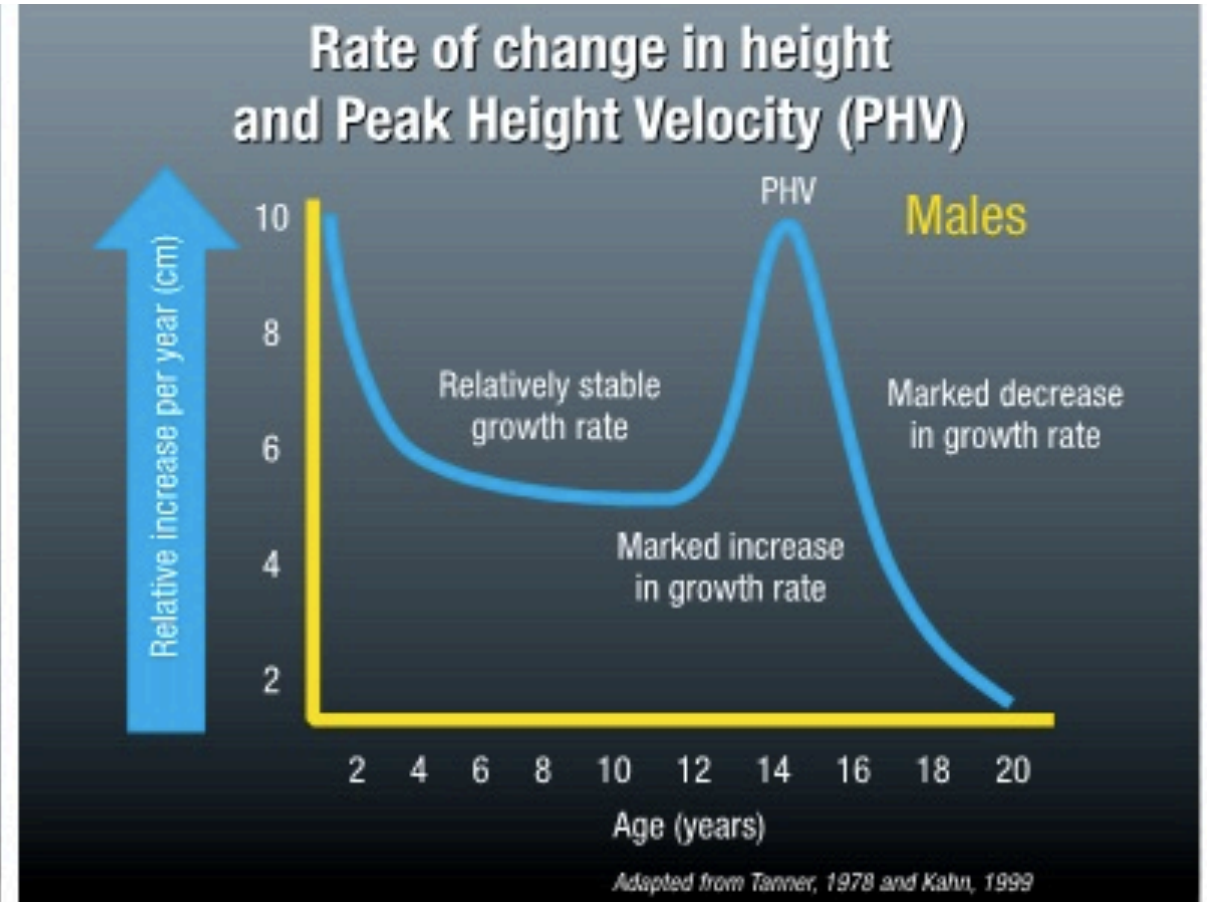
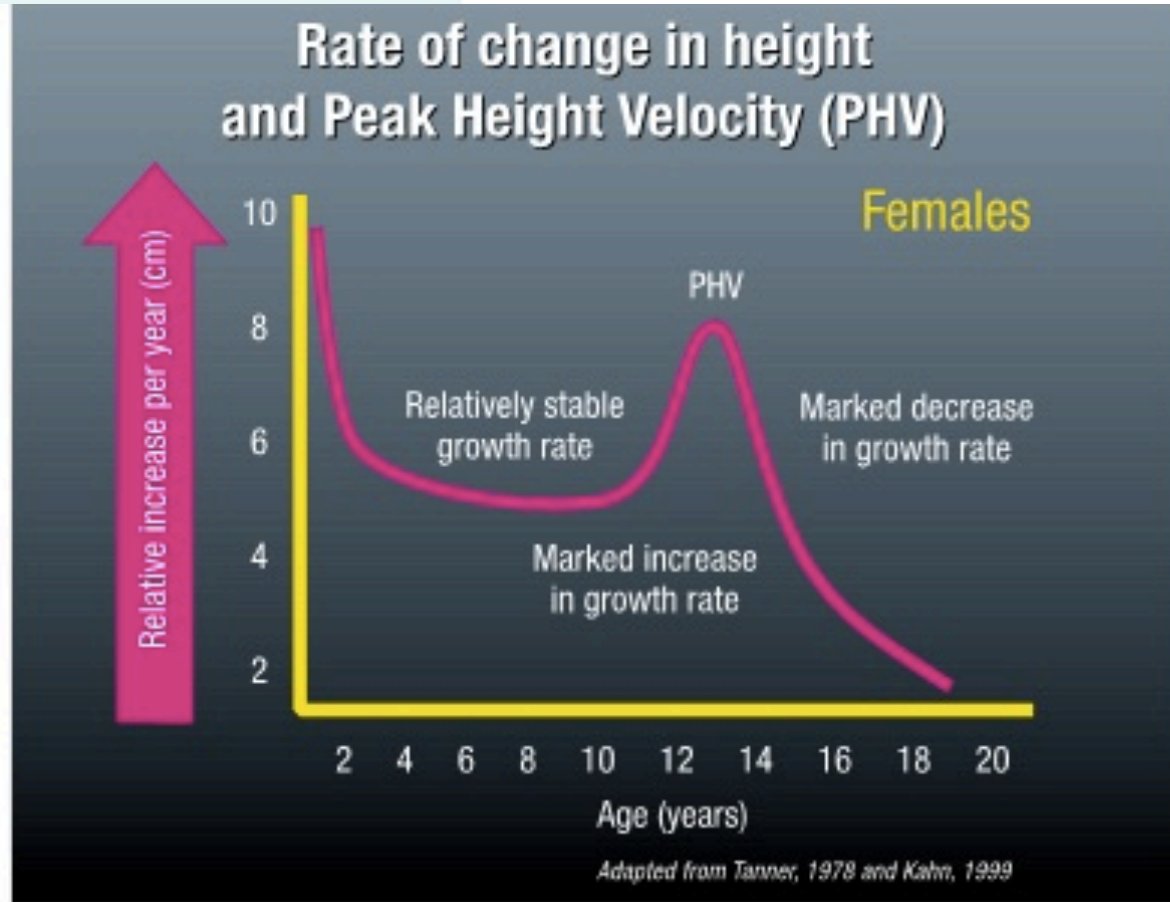
Post-
PHV

Increase training
volume and
intensity

Introduce
advanced
strength and
power training

Specialisation

Boys and girls are different, don't treat them the same.





Dr. Jason Tee

Email: j.c.tee@leedsbeckett.ac.uk

Twitter: @JasonCTee

